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AQUATIC INVERTEBRATES AND HABITAT AT A FIXED STATION ON THE TONGUE RIVER, CUSTER COUNTY, MONTANA

July 26, 2001

A report to
the Montana Department of Environmental Quality
Helena, Montana

by

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INTRODUCTION

This report is one of 38 brief interpretive summaries of data assembled as part of a statewide, multi-year study conducted by the Montana Department of Environmental Quality (MT DEQ). Each report discusses information generated from a single benthic invertebrate sample collection and habitat evaluation at a fixed station established on a gauged river or high-order tributary. The present treatise focuses on the aquatic community sampled on the Tongue River near Miles City in Custer County, Montana on July 26, 2001. The sample site was located by GPS reading at 46° 24' 19" N, 105° 51' 39" W, lying within the Northwestern Great Plains Ecoregion (Woods et al. 1998). The sample was collected by personnel of MT DEQ. Sampling effort consisted of a composite of 3 Hess samples.Habitat parameters were evaluated using the MT DEQ Macroinvertebrate Habitat Assessment Field Form for streams with riffle/run prevalence. Invertebrate samples were processed and animals identified by Rhithron Associates, Inc. Analysis of invertebrates was accomplished by applying the method recommended by Bukantis (1998) for streams of Montana's Plains Ecoregions. The method uses a multimetric battery to evaluate disturbance to biotic integrity. Results from the application of other metric batteries may be found in the Appendix.

RESULTS AND DISCUSSION

Table 1 itemizes the nine evaluated habitat parameters and shows the assigned scores for each, as well as the integrated score and condition category.

Table 1. Stream and riparian habitat assessment for a fixed station on the Tongue River, near Miles City, Montana. July 2001.

Max. possible score	**Parameter**	Tongue River near Miles City
10	Riffle development	5
10	Benthic substrate	1
20	Embeddedness	1
20	Channel alteration	13
20	Sediment deposition	1
20	Channel flow status	12
20	Bank stability: left / right	7 / 7
20	Bank vegetation: left / right	8 / 6
20	Vegetated zone: left / right	7 / 6
160	Total	74
	Percent of maximum CONDITION*	**46** **MARGINAL**

*Condition categories: Optimal > 80% of maximum score; Sub-optimal 75 - 56%; Marginal 49 - 29%; Poor <23%. Adapted from Plafkin et al. 1998.

Overall marginal habitat conditions were mainly attributable to monotonous benthic substrate particle sizes, described in field notes as composed exclusively of gravel. Deposited fine sediments were judged severe, and larger substrate particles were well-embedded. Riffle development was considered marginal. Streambank and riparian parameters were perceived as sub-optimal.

Bioassessment results are given in Table 2. When this bioassessment method is applied to these data, scores indicate that this site on the Tongue River is moderately impaired and only partially supports designated uses. However, very low abundance of organisms in the sample (only 17 animals were collected) complicates the evaluation; conclusions and interpretation of results are tenuous. Whether the inadequacy of the sample was due to a depauperate community at the site or to sampling bias is not clear from the data itself, however, the habitat assessment suggests that the nature of the benthic substrate may limit benthic assemblages.

Table 2. Metric values, scores, and bioassessment for a fixed station on the Tongue River. July 2001. The Montana DEQ bioassessment metric battery recommended for streams of Montana's Plains ecoregions (Bukantis 1998) was used for the evaluation. Extremely low abundance of organisms renders the score, classification, and use support designation unreliable.

	Tongue River near Miles City	
METRICS	METRIC VALUES	METRIC SCORES
Taxa richness	4	0
EPT richness	2	0
Biotic index	5.24	2
% Dominant taxon	35.29	2
% Collectors	76.47	2
% EPT	64.71	3
Shannon diversity	1.90	1
% Scrapers and Shredders	0	0
Predator taxa	0	0
% Multivoltine	33.82	3
	TOTAL SCORE (max.=30)	13
	PERCENT OF MAX.	43
	Impairment classification	**MODERATE**
	USE SUPPORT	**PARTIAL**

Sixty-five percent of the organisms present in the sample function as filter-feeders; the remainder are generalists, omnivores and gatherers. These groups are expected to be abundant in higher-order streams, but if the sample is representative of benthic assemblages at this site, suspended particulate material is likely plentiful. The presence of the hemoglobin-bearing midge *Polypedilum* sp. suggests that hypoxic conditions may characterize the sediments; the measured dissolved oxygen content (7.02 mg/L) supports this hypothesis.

CONCLUSION

- Low abundance of organisms in the sample prohibits assessment of the site based on invertebrate assemblages. Filter-feeders represented 65% of the animals collected, and the possibility of hypoxic sediments cannot be ruled out.

LITERATURE CITED

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft, April 22, 1997. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

Woods, A.J., Omernik, J. M. Nesser, J.A., Shelden, J., and Azevedo, S. H. 1999. Ecoregions of Montana. (Color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia. US Geological Survey.

APPENDIX

Taxonomic data and summaries

Tongue River near Miles City

July 2001

Aquatic Invertebrate Taxonomic Data

Site Name: Tongue River: Miles City **Date: 7/26/01**

Site ID: Y17TONGR01 Approx. percent of sample used. 100

Taxon	**Quantity**	**Percent**	**HBI**	**FFG**
Cheumatopsyche sp.	5	29.41	5	CF
Hydropsyche sp.	6	35.29	5	CF
Total Trichoptera	**11**	**64.71**		
Ordobrevia sp.	2	11.76	5	CG
Total Coleoptera	**2**	**11.76**		
Polypedilum sp.	4	23.53	6	SH
Total Chironomidae	**4**	**23.53**		
Grand Total	17	100.00		

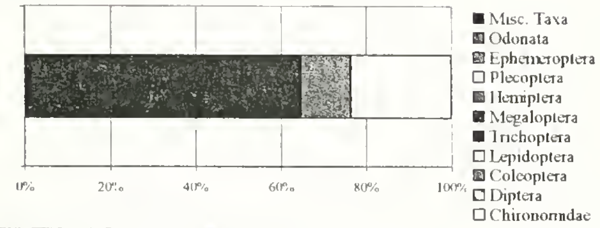
Aquatic Invertebrate Summary

Site Name: Tongue River: Miles City **Date: 7/26/01**

SAMPLE TOTAL	17
EPT abundance	11
TAXA RICHNESS	4
Number EPT taxa	2
Percent EPT	64 71

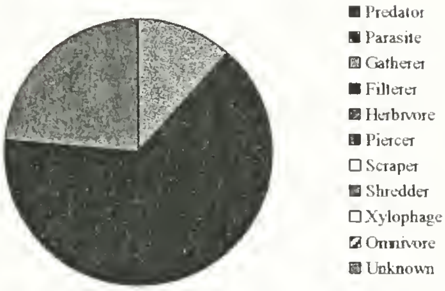
TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Misc Taxa	0 00	0	0
Odonata	0 00	0	0
Ephemeroptera	0 00	0	0
Plecoptera	0 00	0	0
Hemiptera	0 00	0	0
Megaloptera	0 00	0	0
Trichoptera	64 71	2	11
Lepidoptera	0 00	0	0
Coleoptera	11 76	1	2
Diptera	0 00	0	0
Chironomidae	23 53	1	4



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Predator	0 00	0	0
Parasite	0 00	0	0
Gatherer	11 76	1	2
Filterer	64 71	2	11
Herbivore	0 00	0	0
Piercer	0 00	0	0
Scraper	0 00	0	0
Shredder	23 53	1	4
Xylophage	0 00	0	0
Omnivore	0 00	0	0
Unknown	0 00	0	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	0
Percent sediment tolerant	0 00
Sediment sensitive taxa	0
Percent sediment sensitive	0 00
Metals tolerance index (McGuire)	4 53
Cold stenotherm taxa	0
Percent cold stenotherms	0 00

Site ID: Y17TONGR01

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Hydropsyche sp	6	35 29
Cheumatopsyche sp	5	29 41
Polypedilum sp	4	23 53
Ordobrevia sp	2	11 76
SUBTOTAL 5 DOMINANTS	17	100 00
TOTAL DOMINANTS	17	100 00

SAPROBITY

Hilsenhoff Biotic Index	5 24

DIVERSITY

Shannon H (loge)	1 32
Shannon H (log2)	1 90
Simpson D	#DIV/0!

VOLTINISM

TYPE	ABUNDANCE	PERCENT
Multivoltine	6	33 82
Univoltine	9	54 41
Semivoltine	2	11 76

TAXA CHARACTERS

	#TAXA	ABUNDANCE	PERCENT
Tolerant	1	5	29 41
Intolerant	0	0	0 00
Clinger	4	17	100 00

BIOASSESSMENT INDICES

B-IBI (Karr et al)

METRIC	VALUE	SCORE	
Taxa richness	4	1	
E richness	0	1	
P richness	0	1	
T richness	2	1	
Long-lived	0	1	
Sensitive richness	0	1	
%tolerant	29 41	3	
%predators	0 00	1	
Clinger richness	4	1	
%dominance (3)	88 24	1	
TOTAL SCORE		12	24 %

MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	4	0	0	0
EPT richness	2	0	0	0
Biotic Index	5 24	2	1	0
%Dominant taxon	35 29	2	2	1
%Collectors	76 47	2	1	1
%EPT	64 71	3	3	2
Shannon Diversity	1 90	1		
%Scrapers +Shredd	23 53	2	2	0
Predator taxa	0	0		
%Multivoltine	33 82	3		
%H of T	100		0	
TOTAL SCORES		15	9	4
PERCENT OF MAXIMUM		50 00	37 50	19 05
IMPAIRMENT CLASS		MODERATE	MODERATE	SEVERE